

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant : Roggeman, et al.  
Title : Humidification of Hydrocarbon Mixtures for Use in  
Polymer Synthesis  
Application No. : 10/799,565  
Filed : March 11, 2004  
Group Art Unit : 1709  
Examiner : Merkling

**APPEAL BRIEF**

Sir:

This Appeal Brief is filed in response to the Final Office Action mailed January 4, 2008, which finally rejected the pending claims of the instant application. A Notice of Appeal was received by the USPTO on June 4, 2008. Any fees due should be charged to Bridgestone Deposit Account 060925, ref: P00091US1B.

**I. Real Parties in Interest**

The real party in interest is Bridgestone Corporation as evidenced by an assignment recorded at Reel/Frame 012871/0297.

**II. Related Appeals And Interferences**

There are no related appeals or interferences to the instant application.

**III. Status of Claims**

Claims 17-42 are pending and are finally rejected. The rejections of each of these claims are now appealed.

**IV. Status of Amendments**

In a Response After Final dated March 4, 2008, Appellants submitted amendments to claims 27, 28, 36, and 40. The Advisory Action was marked that amendments were not entered. However, the explanation only mentioned that the amendments to claims 36 and 40 were improper, and did not mention claims 27 and 28. Therefore, Appellants have listed the claims in the Appendix with claims 27 and 28 as amended, but with claims 36 and 40 as they stood prior to the Final Office Action.

**V. Summary of Claimed Subject Matter**

The claimed subject matter of independent claims 17 and 31 relates to an apparatus for humidifying a hydrocarbon stream, and claim 33 relates to an apparatus for humidifying and polymerizing a hydrocarbon stream.

**A. Independent Claim 17**

Independent claim 17 is directed to an apparatus for humidifying a hydrocarbon stream. The apparatus includes a vessel 10 with an interior cavity 20 and an inlet 52 adjacent a lower end of the cavity 20 for receiving a hydrocarbon stream. A bed of a packing material 12 is in the cavity 20 and water 26 fills at least a portion of the bed of packing material 12. A disengagement zone 70 includes a hydrocarbon monomer having a water content and undissolved water entrained with the hydrocarbon (page 5, lines 14-28). The elements of this claim are discussed in the specification on pages 3-5.

**B. Independent Claim 31**

Independent claim 31 is directed to a humidification apparatus. The apparatus includes a vessel 10 with an interior cavity 20 and an inlet 52 adjacent a lower end of the cavity 20 and an outlet 74 adjacent an upper end of the cavity 20. A bed of a packing material 12 is in the cavity 20, and the bed of packing material 12 comprises particles 38 which are larger in size toward an upper end of the bed of packing material 12. Water 26 fills a portion of the bed of packing material 12. A head space 22 is included which spaces the outlet 74 from the water 26 and the packing material 12. A disengagement zone 70 includes a hydrocarbon monomer having a water content and undissolved water entrained with the hydrocarbon (page 5, lines 14-28). The elements of this claim are discussed in the specification on pages 3-5.

**C. Independent Claim 33**

Independent claim 33 is directed to an apparatus for humidifying and polymerizing a hydrocarbon stream. The apparatus includes a vessel 10 that defines an interior cavity 20 and has an inlet 52 adjacent a lower end of the cavity 20 for receiving a hydrocarbon stream, a

second inlet 30 for adding water to the vessel 20, and an outlet 74. A bed is disposed in the cavity 20, and the bed includes a packing material 12 and water 26 which fills a portion of the bed. A head space 22 is included in the cavity 20 which allows liquid water to fall out of the hydrocarbon stream (page 5, lines 14-28). A polymerization reactor 98 is coupled to the outlet 74. The elements of this claim are discussed in the specification on pages 3-5.

**D. Dependent Claim 39**

Claim 39 is dependent on claim 33, and further requires a second vessel coupled to the inlet 52, wherein the second vessel 64 includes a mono-unsaturated alkene or conjugated diene. The elements of this claim are discussed in the specification on page 2, line 29 to page 3, line 3, and page 5, lines 2-14.

**V. Grounds of Rejection to be Reviewed on Appeal**

Whether claim 17 is unpatentable under 35 U.S.C. § 102(b) as being anticipated by Okada (JP 05-171164). Whether claim 31 is unpatentable under 35 U.S.C. § 102(b) as being anticipated by Holst (U.S. 5,650,128). Whether claim 31 is unpatentable under 35 U.S.C. § 103(a) as obvious over Okada in view of Holst. Whether claims 33 and 39 are unpatentable under 35 U.S.C. § 103(a) as obvious over Okada in view of Goode (U.S. 6,111,034).

**VI. Argument**

**A. Introduction**

The controversy in this application has surrounded whether it is valid to consider certain claim terms as limiting the apparatus claims. The Examiner contends the limitations are directed

to an article worked upon by the apparatus and not the apparatus itself. While Applicants vigorously dispute this interpretation of the claims in the arguments below, it should be clear that if the current claims were to issue into a patent, the claim terms at issue would be construed by a court to be limitations in view Applicants' numerous statements arguing to that effect in the prosecution history.

### **B. Independent Claims 17 and 31**

Regarding the rejection of claims 17 and 31, the cited reference does not disclose or teach “a disengagement zone, comprising a hydrocarbon monomer having a water content and undissolved water entrained with the hydrocarbon.” The Office Action completely fails to substantively address the “a hydrocarbon monomer having a water content and undissolved water entrained with the hydrocarbon” limitation, and only recites language indicating the Examiner believes the hydrocarbon monomer and undissolved water entrained in the hydrocarbon is not relevant to patentability. Contrary to the Office Action, the water in the disengagement zone is not the article worked upon, nor is it a limitation directed to the manner of operation of the claimed apparatus. The water in the disengagement zone is a physical element of the apparatus. It is not the article worked upon by the apparatus.

Prior case law supports the argument that water, recited in an apparatus claim, should in fact be considered an element of the claim and not the article worked upon. In *In re Nelson and Parker*, 58 USPQ 550 (CCPA 1943), the CCPA reversed the BPAI's rejection of claims directed to an air cooling system. The CCPA held that apparatus claims that contained limitations to a smooth stream of water as part of a ventilating apparatus were patentable over the cited

references. *Id.* at 552-53. A smooth stream of water was not disclosed in the prior art of record and the claims were thus considered patentable over such prior art. *Id.* The water in the claims of *In re Nelson and Parker* is analogous to the water in the current claims. The smooth stream of water operated on the air to adjust the humidity of a fluid (air), *id.* at 551, and this is quite similar to the claims of the current application that also include water for adjusting humidity of a fluid. In both cases the water can be considered part of the apparatus and not the article worked upon or the manner of operation of the claimed apparatus, and these limitations are the distinguishing features from the prior art.

*Hester Industries Inc. v. Steing Inc.*, 142 F.3d 1472 (Fed. Cir. 1998) also supports the fact that water is a proper element of apparatus claims and not merely an article to be worked upon. The patent at issue included apparatus claims for a system for cooking foods that included limitations to “cooking solely with steam” and “two sources of steam.” *Id.* at 1644. The reissue patent was held invalid for failure to comply with 35 U.S.C. 251, para. 1, *id.* at 1652, but the opinion reveals that the Board of Appeals, in an opinion issued on June 21, 1985, reversed the Examiner’s obviousness rejection and allowed the original patent to issue based on the following distinctions over the prior art: “cooking solely with steam” and “two sources of steam.” *Id.* at 1644. The Board stated:

[W]e find no suggestion in the combined teachings of the references which would have led the ordinarily skilled worker in the art to an apparatus utilizing steam as the sole cooking medium; utilizing two separate sources of steam, one of which includes a pool of water in the cooking chamber with means for boiling the water; and wherein the atmosphere within the cooking chamber is maintained above atmospheric by the two sources of steam.

*Id.*

Here water or steam was not considered the article to be worked upon, even though it performed the cooking function on food, and was even combined with the food at some level. This is also analogous to the situation of the current case: the water in the humidification apparatus is a part of the apparatus and should not be considered the article worked upon or the manner of operation of the claimed apparatus

The Office Action cites to, *Ex Parte Thibault*, 164 USPQ 666 (Bd. App. 1969) as supporting the reasoning that a claim term directed to an article worked upon is not relevant to patentability. However, *Ex Parte Thibault* relates to a claim limitation of “a reservoir ... molten condition” and this limitation was found to be disclosed in the reference as a heated tank. Accordingly, since something in a heated tank could be made molten, *Ex Parte Thibault* appears to be a standard situation of inherent anticipation or obviousness. If there is some other circumstance that required the Board to make the broad statement that “expressions relating the apparatus to contents thereof” are of no significance in determining patentability, it is not clear from the facts recited in the decision. It appears that *Ex Parte Thibault* is inapposite to the current claims, where the Examiner has not brought forth any evidence of inherent anticipation or obviousness of the element of the “hydrocarbon monomer having a water content and undissolved water entrained with the hydrocarbon.”<sup>1</sup>

Accordingly, the better rule to follow is the well-established one that has often and more recently been expressed by the Federal Circuit: in order to anticipate a claim, each and every

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<sup>1</sup> While some other court opinions of similar vintage to *In re Thibault* also parrot the statement against limitations to articles worked upon, these cases can also be distinguished on the fact that they are situations of inherent anticipation, mere statements of intended use (often in preambles), or very old cases where a synergistic effect or “flash of inventive genius” was required for patentability of combination claims (which is no longer the law). See *In re Casey*, 152 USPQ 235 (CCPA 1967) and cases cited at 238.

claim limitation must be shown in a reference. MPEP 2131 (To anticipate a claim the reference must teach every element of the claim.). *See e.g. Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987) (“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.”); *and Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989) (“The identical invention must be shown in as complete detail as is contained in the ... claim.”). Even for an obviousness rejection the Examiner must point to each claim element in the cited references or explain why each element is obvious. *See* MPEP 706.02(j). Thus, under either of these standards, a *prima facie* case of unpatentability has not been made, because the Examiner has not brought forth any evidence of anticipation or obviousness of the element of the “hydrocarbon monomer having a water content and undissolved water entrained with the hydrocarbon.”

While the Final Office Action addresses the limitations at issue by using the rubric that they are directed to “the article worked upon” or the manner of operation of the claimed apparatus, this might be more adequately characterized as an attempt to disqualify the claim language from consideration because it has functional characteristics. Even if the claim terms at issue in this case are considered to be functional language, this does not mean that the terms should be ignored. According to Chisum,

A number of decisions condemn patent claims for use of “functional” language, that is, language describing an invention in terms of what it accomplishes rather than in terms of what it is. Functional language is objectionable when it causes a claim to (1) cover more than the inventor has invented and disclosed in the specification or (2) define the invention in a vague and ambiguous manner. Under the better view today, functional language in claims is not objectionable per se so long as it avoids these problems of undue breadth and vagueness.



CHISUM, DONALD S., CHISUM ON PATENTS § 8.04 (Matthew Bender Company, Inc.) (2007) citing *In re Swinehart*, 439 F.2d 210, 169 USPQ 226 (CCPA 1971) and *Home Shopping Network, Inc. v. Coupco, Inc.*, 1998 U.S. Dist. LEXIS 2111 (S.D. N.Y. 1998).

The claim language at issue is not vague or ambiguous or broader than what the specification discloses, and the claim language has not been rejected as such. Thus, these claim terms should be considered.

Accordingly, independent claims 17 and 31 are neither anticipated nor made obvious by the cited references. The claims dependent on claims 17 and 31 recite additional features and are also not anticipated nor made obvious by the cited references. Thus, claims 17 and 31 and their dependent claims are believed to be in condition for allowance.

### **C. Independent Claim 33**

Regarding the rejection of claim 33 and its dependent claims, the cited reference does not disclose or teach “a head space in the cavity above the bed which allows liquid water to fall out of the hydrocarbon stream.” The Final Office Action and Advisory Action fail to substantively address the entirety of this limitation. Again the Examiner indicates that limitations such as “which allows liquid water to fall out of the hydrocarbon stream,” are not relevant to patentability because they are directed to the article worked upon or a manner of operating a device. The recited limitation may have some characteristics of a functional limitation, but again, for the reasons mentioned above, this does not mean that the claim limitation should not be considered for purposes of patentability.

The specification at page 5, line 25-27 discloses that a certain height for the head space or disengagement zone is necessary for the liquid water or entrained water to fall out or separate

from the hydrocarbon. Thus, the limitation “which allows liquid water to fall out of the hydrocarbon stream,” may appear to be functional, but it has a structural implication.

Accordingly, independent claim 33 is neither anticipated nor made obvious by the cited references. The claims dependent on claim 33 recites additional features and are also not anticipated nor made obvious by the cited references. Thus, claim 33 and its dependent claims are believed to be in condition for allowance.

#### **D. Dependent Claim 39**

Regarding the rejection of dependent claim 39, the cited references do not teach “a second vessel coupled to the inlet, wherein the second vessel includes a mono-unsaturated alkene or conjugated diene.” The Final Office Action failed to address this limitation, and merely recites the same reasoning discussed above that limitations directed to articles worked upon are not relevant. Thus, for the same reasons discussed above, the claim limitation should be considered and not summarily dismissed.

In addition, in claim 39, there is clearly a structural feature that is not excused by the Examiner’s interpretation of the law (even if it were valid) and not found in the prior art of record. The second vessel coupled to the inlet with a mono-unsaturated alkene or conjugated diene is not present in the cited references.

The Examiner alleged in the Advisory Action that this feature is shown in Drawing 1 of Okada where the inlet to vessel 4 is coupled to a separate vessel 6. Yet, the text of Okada discloses that this separate vessel 6 is a “mixer” and “humidification gas and a dry gas are mixed here.” Okada, para [0015]. A vessel for mixing gases would be expected to be different from a

vessel for mono-unsaturated alkene or conjugated diene monomer that is coupled to an inlet adjacent a lower end of the cavity for receiving a hydrocarbon stream.

Accordingly, dependent claim 39 is neither anticipated nor made obvious by the cited references. Thus, claim 39 is believed to be in condition for allowance.

#### **E. Summary**

In summary, Appellants assert that the limitations at issue are not directed to a process, an intended use, or merely an article worked upon. Furthermore, the facts of *In re Thibault* are inapposite to this case, and the well-established rule that all claim limitations must be found in the prior art should be respected. To the extent the limitations include functional characteristics, it is improper to exclude them from consideration on this basis. Finally, even if all the Examiner's arguments were to be upheld there should be no doubt that the claim terms at issue, if they were to be included in an issued patent, would be construed by a court to be limitations due to Applicant's arguments in the prosecution history. Thus, it would be proper, and cause no harm to the public to allow applicant's to use such claim terms to distinguish their invention from the prior art. For these reasons, the pending claims are believed to be in condition for allowance.

#### **VII. Claims Appendix**

A claims appendix containing a copy of the claims subject to this appeal is attached.

### **VIII. Evidence Appendix**


No evidence is being submitted pursuant to 37 C.F.R. §§ 1.130, 1.131, or 1.132, nor is there any other evidence entered by the Examiner or relied upon by the Appellant. An evidence appendix indicating "None" is attached.

### **IX. Related Proceedings Appendix**

There are no related proceedings. A related proceedings appendix indicating "None" is attached.

Respectfully submitted,

Date: 7/4/08

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## **CLAIMS APPENDIX**

- 1-16 (Cancelled)
17. (Previously Presented) An apparatus for humidifying a hydrocarbon stream comprising:  
a vessel which defines an interior cavity and having an inlet adjacent a lower end of the cavity for receiving a hydrocarbon stream;  
a bed of a packing material in the cavity;  
water filling at least a portion of the bed; and  
a disengagement zone, comprising a hydrocarbon monomer having a water content and undissolved water entrained with the hydrocarbon.
18. (Original) The apparatus of claim 17, further including:  
a second inlet in the vessel for adding water to the vessel.
19. (Original) The apparatus of claim 17, further including a return line for returning a portion of a hydrocarbon stream which has been humidified to the cavity.
20. (Original) The apparatus of claim 17 further including:  
a mixer for mixing the humidified hydrocarbon stream with an unhumidified hydrocarbon stream to form a combined stream; and  
a sensor for detecting a moisture content of at least one of the unhumidified hydrocarbon stream and the combined stream.
21. (Previously Presented) The apparatus of claim 17, wherein the vessel includes an outlet through which the humidified hydrocarbon stream exits the vessel.
22. (Previously Presented) The apparatus of claim 17, wherein the packing material is in the form of particles.

23. (Previously Presented) The apparatus of claim 22, wherein the particles have a smaller average diameter adjacent a bottom of the bed than adjacent a top of the bed.
24. (Previously Presented) The apparatus of claim 23, wherein the particles in the bottom layer have an average diameter of approximately 0.2 to 0.5 centimeters and the particles in the top layer have an average diameter of approximately 1 to 1.5 centimeters.
25. (Previously Presented) The apparatus of claim 17, wherein the packing material comprises porcelain.
26. (Previously Presented) The apparatus of claim 17, further including a source of the hydrocarbon stream fluidly connected with the inlet.
27. (Previously Presented) The apparatus of claim 26, wherein the source includes at least one hydrocarbon from mono-unsaturated alkanes and conjugated dienes.
28. (Previously Presented) The apparatus of claim 26, wherein the source of the hydrocarbon stream further includes a solvent in which the hydrocarbon is soluble.
29. (Previously Presented) The apparatus of claim 17, further including a head space in the vessel above the bed and the water for allowing liquid water to fall out of the humidified hydrocarbon stream so that the humidified hydrocarbon stream is substantially free of undissolved water.
30. (Previously Presented) The apparatus of claim 17, wherein the particles are spherical.
31. (Previously Presented) A humidification apparatus comprising:
- a vessel which defines an interior cavity and having an inlet adjacent a lower end of the cavity and an outlet adjacent an upper end of the cavity;
  - a bed of a packing material in the cavity, the packing material comprising particles which are larger in size toward an upper end of the bed;

water filling a portion of the bed;  
a head space which spaces the outlet from the water and the packing material; and  
a disengagement zone, comprising a hydrocarbon monomer having a water content and undissolved water entrained with the hydrocarbon.

32. (Previously Presented) The apparatus of claim 31, further including a liquid level gauge for adjusting a height of the water.

33. (Previously Presented) An apparatus for humidifying and polymerizing a hydrocarbon stream comprising:

a vessel which defines an interior cavity, the vessel comprising a first inlet adjacent a lower end of the cavity for receiving a hydrocarbon stream, a second inlet for adding water to the vessel, and an outlet;

a bed in the cavity, the bed comprising a packing material and water which fills a portion of the bed;

a head space in the cavity above the bed which allows liquid water to fall out of the hydrocarbon stream; and

a polymerization reactor coupled to the outlet.

34. (Previously Presented) The apparatus of claim 17, further comprising a second vessel coupled to the inlet, wherein the second vessel includes a mono-unsaturated alkene or conjugated diene.

35. (Previously Presented) The apparatus of claim 17, further comprising a polymerization reactor coupled to the outlet.

36. (Previously Presented) The apparatus of claim 31, wherein the vessel further comprises a disengagement zone, comprising a hydrocarbon monomer having a water content and undissolved water entrained with the hydrocarbon.
37. (Previously Presented) The apparatus of claim 31, further comprising a polymerization reactor coupled to the outlet.
38. (Previously Presented) The apparatus of claim 33, wherein the vessel further comprises a disengagement zone, comprising a hydrocarbon monomer having a water content and undissolved water entrained with the hydrocarbon.
39. (Previously Presented) The apparatus of claim 33, further comprising a second vessel coupled to the inlet, wherein the second vessel includes a mono-unsaturated alkene or conjugated diene.
40. (Previously Presented) The apparatus of claim 31, wherein the mono-unsaturated alkene or conjugated diene is a liquid.
41. (Previously Presented) The apparatus of claim 21, further comprising a three-way valve coupled to the outlet, a sampling chamber, and a polymerization reactor.
42. (Previously Presented) The apparatus of claim 41, further comprising a heater coupled between the three-way valve and the sampling chamber.



## **EVIDENCE APPENDIX**

(none)

**RELATED PROCEEDINGS APPENDIX**

(none)